Manitoba and Climate Change:

WORKBOOK

This workbook is a companion document to the Manitoba Primer on Climate Change. Each section of this document compliments information provided in the Primer. The topics in these sections are: Agriculture, Forestry, Energy, Northern Communities, Transportation, Commercial and Residential Buildings, Public Outreach and Consumer Lifestyles and Industry.

These sections are intended to address specific climate change concerns for the province of Manitoba. They explain how or why the particular area merits Manitoban's attention as well as the mitigation and adaptation strategies that may be adopted in response to climate change impacts. A working section addresses critical questions for Task Force participants to address during the course of their meetings and public consultations.

Responses can be sent to:

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Agriculture

Of all the sectors of Manitoba's economy, agriculture is perhaps most directly dependent on annual weather conditions and long-term climatic factors. Small annual fluctuations as well as extreme events impact crop and livestock production, and determine the economic success of farmers and agri-business. Most climate change scenarios predict that a doubling of atmospheric carbon dioxide will lead to warmer conditions throughout the year. At the same time, precipitation patterns are anticipated to change. The impacts of this change are not expected to be uniform. Spring precipitation is expected to increase. In contrast, drier conditions are predicted during the summer months due to increases in evaporation and reductions in soil moisture that could have an adverse affect on agriculture. As well, the timing, frequency and intensity of extreme events such as drought and floods might be altered, increasing the risk of spring time flooding and the need to expand water supplies to downstream sources during times of drought. These changes will have implications for crop insurance programs.

Crop production might benefit from the warmer summer weather and longer growing season. Increased opportunities for crop diversification may become available, such as expanded production of longer season crops or drought-tolerant species. Crop production might expand in northern regions where suitable soil conditions exist. Warmer weather, though, could increase winter survival of insects, disease and weeds. The movement of southern pests northward could challenge agriculture. The risk of insect infestations might potentially lead to greater pest damage and reduced crop yields. In the summer, the greater risk of drought could enhance the need for irrigation or on-farm water management.

The livestock sector will also need to consider climate change. Warmer winters could reduce livestock stress and the energy required to heat facilities. Increased summer temperatures could lead to greater heat stress in the animals. A lack of moisture during the growing season could impact the quality and quantity of pastures and hay production. As well, there might be a need for increased on-farm water supply management techniques such as dugouts.

Reduction of greenhouse gas emissions and adaptation in the agricultural sector would help offset these impacts. In 1998, greenhouse gas emissions from Manitoba agriculture (7,200 kt CO_2 eq) accounted for 34 per cent of the province's total. Nearly two-thirds of agricultural emissions are estimated to arise from nitrous oxides released from cropping and manure management practices while 23 per cent come from methane released through enteric fermentation and manure practices. The agricultural sector can work to reduce greenhouse gas emissions through methods such as zero tillage, shelterbelts, reduced fossil fuel use, best management practices in manure and fertilizer use, livestock feeding strategies, and other land management practices.

To remain competitive, Manitoba's agricultural sector will need to adapt to climatic change, address economic uncertainty and conserve its natural resource base. As successful sustainable agriculture production will be dependent on the predictability of conditions, there is a need to understand the effect of changing climate on land, water and daily weather. As well, government policies and programs will influence the ability of farmers to adapt to changing climatic and global economic conditions. Appropriate economic policies could include modifying safety net programs to reflect actual risk from climate, and reward programs linked to soil and water conservation.

The livestock sector might be better able to adapt to the impacts of climate change due to the greater mobility of animals and access to feed. Increased livestock production and diversity could be a key means by which farmers adapt to climate change. Expanded ranching of indigenous species, such as buffalo and elk that are more adaptable to the climate of the prairies than traditional livestock, could also be an appropriate response.

As climate change takes place, there could be numerous opportunities and challenges for Manitoba's agricultural industries and communities. Agroforestry, ethanol and fibre industries such as agri-pulp and strawboard will provide future opportunity. Carbon sequestration in our soils might provide an economic and environmental benefit. The response needed to address climate change provides one more good reason to further best management practices in the interest of agriculture sustainability.

For agriculture, Climate change is a new twist on an old problem. We have just begun to recognize the importance of mitigating greenhouse gases, adapting to climate change and responding to global policy such as the Kyoto Protocol. The bulk of action within the Manitoba agriculture sector will be in the future.

Questions:

Q1: What are the main information needs regarding the potential impact of climate change on the agriculture sector in Manitoba? How well understood are the implications of a 4–6 degree C increase in the province's mean annual temperature on Manitoba's agricultural sector?

A:

Q2: Which management practices are most effective in enabling producers to reduce greenhouse gas emissions and increase carbon sequestration? How can these management practices be encouraged?

A:

Q3: What practical approaches can farmers take to make agriculture a viable, self-sustaining economic activity to ensure that they are protected from the impacts of climate change?

A:

Q4: How aware are members of Manitoba's agricultural community of the potential implications of climate change on their livelihoods and economic sector? In view of the numerous issues facing farmers, how can this information be provided in an effective and informative manner?

A:

Q5: How aware is the agricultural community of opportunities to sequester or store carbon in their soils? How could the agricultural sector best make use of potential market mechanisms, such as emissions trading, to take full economic advantage of sequestering opportunities?

A:

Q6: What role can agri-business play in reducing its own greenhouse gas emissions and encouraging reductions by producers?

A:

Q7: Which provincial and federal policies currently in place serve to encourage the use of technologies or practices that result in high greenhouse gas emissions? How can these policies be identified and changed to become more compatible with a greenhouse gas reduction strategy?

A:

Q8: What collective regulatory structures or incentives are available to Manitoba farmers that encourage the use of sustainable land-use practices and technologies? How can these be improved and/or augmented?

A:

Q9: What would be the most effective mechanisms for engaging the Manitoba agricultural community in a provincial climate change strategy?

A:

Q10: What are the possible synergies between agriculture and industry when seeking opportunities for reducing greenhouse gas emissions and increasing carbon sequestering? (e.g., isoboard production, which prevents the burning of stubble and more permanently stores carbon-containing fibres.)

A:

Q11: One of the challenges of the Manitoba Department of Agriculture and Food is to encourage sustainable agriculture through an integrated environmental, social and economic approach. This includes ensuring the community sustainability and economic prosperity of Manitoba's agriculture and food sector through increased diversification and value added activities. How can the Department and the agriculture and food industry fulfil this challenge while at the same time ensuring that the commodities produced contribute to a greenhouse gas reduction strategy and are appropriate for changing climatic conditions?

A:

Q12: Climate change is a new challenge for agriculture. What awareness, adaptation and mitigation activities taking place in Manitoba can you identify? What opportunities do you see for the agricultural sector in terms of research, on-farm demonstrations, other farm programs, etc. related to climate change?

A:

Energy

Energy produced in Manitoba accounts for only 25 per cent of all energy used in our province. Nearly all of this provincially produced energy is derived from hydroelectricity. The remaining portion is derived from a variety of sources, including a small amount of ethanol that is produced and mixed with gasoline as a transportation fuel. As well, there appears to be a significant, but poorly documented, amount of wood consumed for space heating purposes. Currently, solar (excepting passive) and wind generation is limited to a few installations, while geothermal energy (or, more correctly, geo-exchange) is experiencing some growth, predominantly in rural Manitoba. Manitoba also has a small oil producing area in the south-western portion of the province. All oil from this area is exported as the limited amount of oil produced in Manitoba doesn't makes it economically attractive to build and operate refinery facilities in the province.

Three-quarters of the energy used in Manitoba is imported. Almost all of this energy comes from fossil fuels such as natural gas, natural gas liquids and refined petroleum products, which are used mainly for heating (space, water and process) and transportation. These fuels comprise the majority of energy-related greenhouse gas emissions in Manitoba. In fact, energy-related emissions make up over 60 per cent of all greenhouse gas emissions (GHGs) in the province.

Manitoba Government statistics and projections show that provincial consumption of natural gas, refined petroleum products and electricity is rising and will continue to rise despite current efforts to promote energy conservation. Increased importation of fossil fuels means that Manitoba's contribution to greenhouse gas emissions rises, in addition to wealth being transferred out of province to pay for these products. Rising provincial demand also reduces the ability to electricity providers to earn income through export sales.

From the perspective of reducing Manitoba's emissions of energy-related greenhouse gases, considerations for Manitobans can be focused around three key issues/options:

- Increased production and use of renewable, non-GHG energy resources;
- Reduction in use of fossil fuels that contribute to provincial GHG emissions (through energy efficiency improvements, alternative energy technologies);
- Substitution of renewable, non-GHG producing energy resources for non-jurisdictional, imported fossil fuels.

Manitoba's Electrical Energy Sector

Currently, hydroelectric generation is Manitoba's largest source of provincially supplied renewable energy. Two companies currently sell electricity in Manitoba—Manitoba Hydro and Winnipeg Hydro. Manitoba Hydro is a provincial crown corporation that has 14 generating stations (12 hydroelectric and two coal-fired) and four diesel generation sites, each of which provide energy to a remote community. It is currently building two

new natural gas-fired combustion turbine units at its Brandon Generating Station. Winnipeg Hydro, a department of the City of Winnipeg, has two hydroelectric plants. It buys the reminder of its electricity supply from Manitoba Hydro. As well, Tolko Industries near The Pas uses waste wood to generate a portion of the electricity needed to support its operation.

Further development of Manitoba's hydropower resources to displace fossil-fuelled generation outside of Manitoba has been identified as one of the least costly means by which Canada can reduce its greenhouse gas emissions.

Manitoba's hydraulically generated electricity is a very low emitter of greenhouse gases, particularly when compared to fossil fuels such as natural gas and coal. While the evidence available today estimates that Canadian reservoirs produce less than three per cent of the greenhouse gas emissions that coal-fired generation produces (for the same energy production), there is considerable uncertainty whether the estimate should be in the range of 0–3 per cent of coal. Studies of Manitoba Hydro's reservoirs are the subject of on-going research. The designs for new hydro plants being considered in Manitoba have been revised to minimize the amount of flooding required, which further reduces the emissions potential of future hydro developments to insignificant levels.

Climate change will almost certainly have an impact on Manitoba's hydropower resources. However there is no clear evidence that these impacts will be significant or predominantly negative. Precipitation rates are expected to increase as Manitoba's climate changes, but are also expected to be concentrated in more severe weather events with longer dry periods between each event. It is unclear whether this change in the precipitation pattern would have a net positive or negative impact on water flow conditions in Manitoba, and therefore on hydropower production.

A limited amount of electrical energy produced in Manitoba is generated using fossil fuels. The recent decision by Manitoba Hydro to convert its Selkirk Generating Station from a coal to a natural gas fired operation will reduce emissions from this source. As well, connection of remote communities using diesel powered electrical generation has reduced emissions from this source over the years. Expanded use of renewable energy sources such as solar, wind and geothermal may result in further reductions in these situations, as will increases in energy efficiency. Balanced with these activities are the impacts associated with continued use of coal at the Brandon generation stations and the new 225 MW of natural gas turbine capacity scheduled for construction at Brandon (natural gas is a relatively clean source of thermal energy, but it produces considerable more CO_2 emissions than hydraulically generated electricity). If a market is developed for emissions credits, this mechanism might be one way of mitigating potential increases associated with this thermal electrical production.

Other Renewable Energy Developments / Energy Efficiency Opportunities / and Alternative Energy Technology Options:

Manitoba has a long history of government and utility energy efficiency programs which not only reduce consumer costs, but have the added benefits of either reducing the use of fossil fuels, or freeing up hydro electricity for the export market. Considerable opportunities exist for expanding existing initiatives, and introducing new initiatives beyond the traditional building sectors. Transportation and agriculture may be strong candidates for such expansion as well as for introducing alternative, renewable energies such as biomass derived fuels (example ethanol) or implementation of alternative technologies (wind, geo-exchange technology, methane gas conversion to energy). It could also be possible to achieve energy efficiency and emissions reductions in transportation, such as through increased mass transit opportunities. In addition, energy policy options that may be considered or expanded upon could include policies and programs that encourage the direct substitution of indigenous renewable energies for imported carbon-rich fuels.

Questions:

Q1: To reduce greenhouse gas emissions, what should be the focus of the Manitoba government? (e.g., development of renewable resources, the provision of energy efficiency programs targeted at greenhouse gas emitting energy usage?)

A:

Q2: What opportunities to increase the use of alternative and renewable energies should the Government of Manitoba support? How should this support be provided?

A:

Q3: Should government assistance be provided to improve all energy supply infrastructure, or should it be strategically linked to renewables?

A:

Q4: Which potential renewable forms of energy are most appropriate for use in isolated communities, particularly in the north?

A:

Q5: Does the current policy or regulatory environment foster the introduction of new renewable energy production, such as from wind?

A:

Q6: Should Manitoba initiate policies to support the development and substitution of Manitoba produced renewable resources for imported fossil fuels? If so what policy or program options should be pursued?

A:

Q7: Should Manitoba pursue policies that protect a portion of its renewable energies for use by Manitobans, or should they be developed for the export market?

A:

Q8: What opportunities might Manitoba Hydro have to offset greenhouse gas emissions in other areas of Canada and the United States that rely on fossil fuels for their electricity generation, particularly if market mechanisms such as emissions trading are in place? How do we take advantage of these opportunities?

A:

Q9: What are the barriers to electricity exports? How do we move beyond them?

A:

Q10: How are Manitoba's energy consumers being educated on energy conservation methods? Are there other initiatives that should be considered?

A:

Q11: What is the likely impact of climate change on electricity demand in Manitoba? What knowledge is needed to improve our understanding of such impacts?

A:

Q12: Do we require additional information regarding the potential impact of climate change on water levels in the dams, and therefore the supply of hydroelectric power?

A:

Q13: Should policies be designed to foster electrical production from renewable resources other than hydro for off-the-grid communities and on-the-grid communities? What policies do you recommend?

A:

Q14: Should Manitoba Hydro make greater provisions for independent power production (IPP)? If so, should there be a preference for IPPs that can illustrate a climate change benefit?

A:

Q15: Following the lead of Tolko Industries, are there opportunities for other Manitoba businesses to engage in small-scale production of electricity or other forms of energy? How conducive is the pricing incentive to encouraging businesses to take advantage of these opportunities?

A:

Q16: Should utilities promote other forms of renewable energy for electricity production? What mechanisms can be used to achieve this goal?

A:

Forestry

Significant disruption of existing ecosystems is expected to take place as global climate change proceeds. Due to its high latitude and climatic sensitivities, one of the most vulnerable ecosystems is the boreal forest, which constitutes 67 per cent of Manitoba's forested land and is the main source of supply for the province's forest industry. The boreal forest also supports the traditional livelihoods of numerous Aboriginal communities, provides recreation and tourism opportunities, supplies non-timber forest products, and is home to a diversity of plant and animal species. Early in 2001, the United Nations Intergovernmental Panel on Climate Change predicted that climate change will significantly disrupt and might cause irreversible damage to the health of all forests, including Manitoba's.

Increasing mean annual temperatures might initially promote greater forest productivity. As temperatures continue to rise though, evaporative demand is expected to increase while soil moisture decreases, leading to an increase in the frequency and intensity of drought. These changes are expected to impact each tree species differently. Some will be able to cope; others will not. Drought-stressed forests will be more susceptible to damage from insects and disease; climate change may lead to an increase in the frequency and intensity of insect, disease and fire events.

The impact of these processes will be a change in the composition of Manitoba's forests. The boreal forest is expected to move northward due to increased dieback and decline along its southern limits, but may be unable to extend into the existing tundra ecosystem due to the poor soils in this region. Species from the southern mixed Aspen Parkland forest may extend further north, but lack of soil moisture could make this area of the province more suitable for grasslands. Overall, it is predicted that there will be a net decrease in the province's forest area. Changes in the composition and location of Manitoba's forests may take place in response to even a 1 degree C increase in mean annual temperature.

The predicted changes in the composition, distribution and health of Manitoba's forests will have significant negative impacts on the province's forest industry and forest-dependent communities and species. The forestry sector will be challenged by increasingly variable yields, reduced productivity, declines in natural regeneration of commercial species and changes in age-class structure. Wildlife habitat will be disrupted, which will most heavily impact endangered or threatened species such as the woodland caribou, and could lead to greater rates of extinction. Tourism, fishing and other industries that rely upon the current composition of forested lands will also be affected. Impacts will be felt as well by First Nations communities that continue to rely upon the land for hunting, fishing, non-timber forest products and the spiritual benefits it provides.

The Kyoto Protocol allows countries to meet part of their emissions targets by increasing the amount of carbon that is absorbed from the atmosphere by "sinks," such as forests, on their territory. Storing carbon in sinks may be a very cost-efficient means of reducing net emissions, but several technical difficulties first need to be overcome. These difficulties

include managing the volume of carbon re-released through disturbances to the forest such as fires and harvesting, and establishing monitoring systems. If these difficulties can be overcome, afforestation of marginal lands, as in Manitoba's forest-fringe, could be used effectively to assist the province to meet its emissions target.

Climate change also provides several opportunities for the Manitoba forestry sector. In order to take advantage of these opportunities, and to address the challenges posed by climate change to Manitoba's forests, an emphasis needs to be placed on adaptive forest management. The forest industry needs to adopt strategies to cope with increased tree stress due to drought and to prevent the spread of forest fires. Ecological resiliency needs to be increased by conserving biological diversity, reducing fragmentation, enhancing connections between habitats and addressing human-induced environmental stresses such as pollution. Forest-dependent communities need to develop action plans for how to meet the anticipated challenges brought about by climate change.

Questions:

Q1: What research needs to be undertaken to identify how the forest industry might adapt to the challenges posed by climate change? (e.g., identification of new markets for forest products, species enhancement, introduction of new forest management practices.)

A:

Q2: While climate change is predicted to lead to a decrease in forest productivity in the northern latitudes, it might lead to enhanced timber in the equatorial regions. This process will further promote existing trends towards developing countries having a rising share of the market. How can the Manitoba forest industry position itself to meet this challenge?

A:

Q3: How could an adaptive forest management system be introduced in Manitoba?

A:

Q4: What might be the impact of changing conditions in the boreal forest on forest-dependent communities, particularly Aboriginal communities? How can these impacts be mitigated?

A:

Q5: How well understood are the implications of climate change on the plant and animal species of the boreal forest, and on the ecosystem as a whole? What are the most outstanding research needs in this area?

A:

Q6: What will be the impact of climate change on the 9,000 people directly employed by the forestry sector in Manitoba? How might these impacts be offset?

A:

Q7: Depending upon the outcome of international negotiations, afforestation activities might become viable means for companies to offset their carbon dioxide emissions. Under this scenario, how can afforestation of marginal lands, particularly private lands, be encouraged in Manitoba?

A:

Q8: What are the opportunities for the Manitoba forestry sector to take advantage of economic instruments, such as emissions trading?

A:

Q9: What strategies might be used by the forest industry to reduce its own greenhouse gas emissions, from woodland and processing operations to the transportation and supply of finished products?

A:

Q10: How should management of the non-timber values of the forest—such as carbon storage, watershed protection and biodiversity—be undertaken within the context of climate change?

A:

Q11: What impact will climate change have on the province's system of parks and ecological reserves? How should these impacts be mitigated?

A:

Manufacturing & Industrial Activity

Manitoba's manufacturing and industrial sector produces a diversity of products, such as converted wood products, chemicals, paint, textiles and apparel. Less than six per cent of Manitoba's greenhouse gas emissions are produced by this sector.[1]

Some companies in Manitoba are beginning to benefit from the cost savings and risk management captured by eco-efficient production processes. Strategies to mitigate emissions and adapt to climate change can create opportunities for new products and new markets while producing fewer emissions and cleaner products for consumers. Reducing resource inputs, utilizing cleaner production methods and eliminating waste not only results in measurable reductions in greenhouse gas emissions, they also provide some competitive advantages.

Questions:

Q1: What can you do in your business to reduce greenhouse gas emissions?

A:

Q2: What type of information or assistance do you require to undertake greenhouse gas reducing activities?

A:

[1] *Source*: Environment Canada. 1997 Greenhouse Gas Emission Summary. http://www.ec.gc.ca/pdb/ghg/Provem_e.cfm.

Q3: With which of the following industry and business programs targeting eco-efficiency are you familiar?

Climate Change Action Fund
(http://www.gov.mb.ca/natres/energy/mccaf/mccaf-brochure.html)
Power Smart at Manitoba Hydro
(http://www.hydro.mb.ca/products_splash_frame.html)
Commercial Buildings Incentive Programme (http://oee.nrcan.gc.ca/)
Industrial Energy Innovators (http://oee.nrcan.gc.ca/)
Voluntary Challenge Registry (http://www.vcr-mvr.ca/)

Q4: Are you sufficiently familiar with emissions trading (the buying and selling of greenhouse gas emission units) to judge its potential for your business? If yes, are you considering emissions trading?

A:

Northern Communities

It is generally agreed that the impacts of climate change are likely to occur more rapidly and more severely in northern Manitoba than in the rest of the province. The most pronounced changes will be related to temperature and precipitation. Mean annual temperatures during the spring and fall are predicted to increase by 1–2 degrees C, with greater increases between 3–4 degrees C in the summer and 5–7 degrees C in the winter anticipated. Precipitation is predicted to increase by 10–20 per cent in the summer, 5–10 per cent in the fall and 10–15 per cent in the winter.[1]

The impact of these changes on the natural environment will be significant. Northward flowing rivers throughout the mainland are expected to have decreased flows and levels. Over half of Canada's permafrost zone could disappear, with the boundary between continuous and discontinuous permafrost shifting northwards perhaps hundreds of kilometres. The composition of Manitoba's tundra ecosystem will change to include more shrubs and moisture-tolerant vegetation. A northward shift of the treeline is predicted, but could be restricted by a lack of suitable soil conditions. In Hudson Bay and James Bay, an increase in the length of the ice-free season will cause food shortages for the polar bear population, possibly to the extent that they are no longer able to store enough fat to survive. Rising sea levels could lead to flooding of coastal facilities and increased coastal erosion.

Communities in Canada's high Arctic are observing increases in permafrost melt, earlier springs, reduced sea-ice cover, fewer ice floes, increases in the number of insects and the arrival of exotic species of birds and fish. Similar changes are likely to occur in Manitoba in the near future. Some impacts can be seen today—early signs of climate change impacts on the polar bear populations in Hudson Bay and James Bay have already been recorded.

These changes in the natural environment will have significant ramifications for northern communities. Permafrost melting could lead to changes in drainage patterns, increased slumping and altered landscapes. This process will disrupt infrastructure such as roads, landing strips, pipelines and building foundations. Warmer winters could reduce the use and safety of ice roads, increasing the cost of importing goods into remote settlements and reducing community members' access to services. Changes in the composition and survival of northern species could impact traditional lifestyles, as well as the tourism industry. At the same time, shipping opportunities from the port of Churchill could expand, particularly as the ice-free season of the Northwest Passage is expected to increase by one to three months. Lower heating costs could also be a benefit of climate change.

Mitigation of greenhouse gas emissions is required to slow the rate of climate change and reduce its overall impact. The mining sector in Manitoba has already played a role in

[1] *Source*: Canadian Centre for Climate Modelling and Analysis, Canadian Climate Impact Scenario Project, predictions for 2050.

achieving this goal. It has reached and exceeded the emissions target of six per cent below 1990 levels set by the Kyoto Protocol and produces less than one-tenth of one per cent of Manitoba's greenhouse gas emissions.[2] Although only a small proportion of our province's total emissions are produced in northern Manitoba, all Manitobans have a role to play in mitigation activities and developing strategies that address the impacts of climate change.

Questions:

Q1: Northern communities are going to experience economic and environmental impacts due to climate change. What will be the consequences of these impacts for northern communities and their lifestyles? How should these impacts be addressed from a policy perspective?

A:

Q2: The disruption of normal weather patterns and changing climatic conditions will alter the landscape of the north—its plants and animals, drainage patterns and ice conditions. These changes will have significant social impacts and could lead to the further loss of Aboriginal peoples' traditional way of life. What will be the social impacts of climatic change and how can these impacts be addressed from a policy perspective?

A:

[2] *Source:* Environment Canada. http://www.ec.gc.ca/pdb/ghg/Provem_e.cfm.

Q3: Permafrost melt will have significant impacts on infrastructure such as roads, transmission lines, water supply and building foundations. What are the requirements for adapting infrastructure to meeting the challenges posed by changing climate?

A:

Q4: The habitat and food availability of Arctic species such as polar bears and caribou will be significantly impacted by climate change. How well understood are the implications of climate change on Arctic ecology? What are the main research needs in this area?

A:

Q5: How can information about adapting to climate change and reducing greenhouse gas emissions best be disseminated to northern communities?

A:

Q6: What policies are in place to help communities reduce their greenhouse gas emissions or implement strategies to adapt to climate change? Are there current policies that hinder the ability of communities to make these changes?

A:

Q7: Realizing that greenhouse gas emissions are primarily produced in southern Manitoba, how can the federal and provincial governments work together and with northern communities to cope with the impacts of climate change?

A:

Q8: How can we make use of traditional knowledge of the land to measure and understand climate change?

A:

Q9: What are the critical implications of climate change for the larger communities in northern Manitoba, such as Churchill? How can these communities position themselves to deal with, and take advantage of, these changes?

A:

Q10: What are the planning needs of northern communities trying to cope with the impacts of climate change? What resources need to be made available?

A:

Q11: What are the potential economic and environmental implications of an increase in the number of ice-free days in Hudson Bay and the Northwest Passage for northern communities? How can these impacts be dealt with?

A:

Q12: What are the potential renewable forms of energy that are appropriate for use in isolated communities, particularly in the north?

A:

Public Outreach and Consumer Lifestyles

As revealed in *Manitoba and Climate Change: A Primer*, greenhouse gas emissions in Manitoba can be broken down into four major areas: agriculture; transportation; residential and commercial buildings; and manufacturing and industrial activity. With the exception of some agricultural and industrial emissions, virtually all emissions from these sectors can be traced back to the use of energy. Considering the public understanding of energy use and its contribution to greenhouse gas emissions, the outreach efforts undertaken to influence this understanding is an important part of creating a climate change action plan.

Recently, a joint Environment Canada/Manitoba Conservation survey confirmed that most people accept that climate change is influenced to some degree by human activities. Unfortunately, this belief often seems to be based on the occurrence of extreme weather events and short spells of atypical Manitoba weather and not on an understanding of the scientific facts of climate change. To address this situation, federal and provincial government departments, Manitoba municipal governments, and national and local environmental non-governmental organizations (ENGOs) are engaged in educating the public about the science of climate change.

Outreach and Educational Activities

There is great capacity at the provincial and local government departmental and agency (i.e. Manitoba Hydro) levels, and within the Manitoba ENGO community, to educate and positively influence Manitobans. For example, the local ENGO Resource Conservation Manitoba runs the innovative Green Commuter Initiative. Funded by the federal government and private foundations, in an effort to reduce GHG emissions, the Green Commuter Initiative discourages reliance on single-occupancy vehicles through billboard advertising, radio and television commercials, and participation/competition in a nation-wide commuter challenge. This emphasis on vehicle use arises from the statistic indicating that 32 per cent of Manitoba's GHG emissions come from the transportation sector and 60 per cent of this amount is created by passenger vehicles. With this in mind, the project promotes a shift to active transportation alternatives, like walking, cycling, transit and carpooling.

Other organizations also seek to educate and influence consumers. Manitoba Hydro recently announced a low interest loan program to help finance home energy efficiency retrofits and also operates an online home comfort and energy savings program. Manitoba Conservation holds an annual series of home energy efficiency workshops and actively provides the public information through access to technical experts and through publications available at its Energy Answers Information Centre.

Appropriate Reporting by Media

The media in Manitoba play an important role in influencing and generating public opinion and debate on climate change issues. For instance, CBC Radio recently ran a series on its morning show that highlighted sustainable energy during which complex issues around this subject were presented in an understandable fashion.

One of the many challenges faced in creating a climate change strategy will involve effectively reaching identified audiences, especially the media. It has been noted that while you can provide media with information, you cannot control how they report the issue. Organizations that follow well defined communications strategies; provide reporters with clear, relevant and timely key messages on climate change issues; and identify experts in the field are generally more successful in having the intended message distributed.

Questions

Q1: Who are the key audiences that must be targeted in a public awareness campaign on climate change in Manitoba?

A:

Q2: What are the key messages that should be delivered to each of these key audiences?

A:

Q3: Where do you currently get your information regarding climate change?

A:

Q4: How many places are you willing to search before you find the specific information you desire?

A:

Q5: What or whom do you consider a credible source of information on climate change?

A:

Q6: What types of information do you require from a climate change information resource?

A:

Q7: What are you willing to change in your lifestyle to reduce the climate change impacts of your activities?

A:

Q8: What methods of delivery (e.g., television, radio, newspaper and billboard public service announcements, consumer education programs, school curriculum additions) for a public awareness campaign on climate change are most effective for each target audience?

A:

Q9: How can decision-makers be best informed about Manitobans' concerns regarding climate change? How can they effectively respond to those concerns?

A:

Q10: What should be measured to assess the impacts of public awareness strategies on climate change? How should these strategies be monitored and measured?

A:

Q11: What resources (types and levels) are required to implement an effective, sustained public awareness strategy?

A:

Q12: How can provincial and municipal governments better show leadership around climate change?

A:

Residential and Commercial Buildings

Buildings in Manitoba emit an estimated 15 per cent of the province's greenhouse gases, mostly through energy-related emissions associated with space and water heating. These emissions are shared equally between residential and commercial buildings. The majority of buildings in the province are currently heated with natural gas, followed by electricity and a much smaller proportion (within the residential sector) by wood. Recent increases in the price of natural gas have resulted in speculation that, should prices continue to hold or increase, a greater proportion of Manitobans may choose to heat their homes and businesses with electricity.

Rising winter temperatures would reduce the amount of energy required to heat buildings using natural gas, while warmer summers could increase air conditioning requirements supplied through electricity. The net effect should be a decrease in greenhouse gas emissions.

Opportunities to further reduce emissions, and perhaps operating costs, could be realized through increased efficiency in building components; building designs that take advantage of passive heating and cooling; and the use of more energy efficient equipment and appliances. Existing programs that provide information and, in some instances, financial assistance to improve building efficiencies—like those currently offered through Manitoba Hydro, Manitoba Conservation and other institutions—may be expanded.

Questions

Q1: What alternatives to natural gas could Manitoba promote for use in commercial and residential buildings? What policies should be promoted to increase the use of these cleaner alternatives?

A:

Q2: How can Manitobans be encouraged to retrofit their existing homes and buildings to increase energy efficiency?

A:

Q3: How does the energy efficiency of Manitoba industries compare to that of industries in other provinces? How can the energy efficiency of these industries and their manufacturing processes be increased?

A:

Q4: What are the policy and technological barriers to improving energy efficiency and reducing greenhouse gas emissions in buildings and the manufacturing sector?

A:

Q5: Should Manitoba consider financial assistance programs to help owners improve the energy efficiency of their buildings? Should monies supporting these initiatives be raised through modest energy-related fees (e.g., taxes, wires or pipe charges), general revenues, utility revenues or existing financial institutions?

A:

Q6: Due to the greater energy efficiency and greenhouse gas emissions reduction resulting from R-2000 construction, should Manitoba make the R-2000 standard mandatory for all new homes?

A:

Q7: Should Manitoba consider mandatory energy code standards for all new buildings similar to the proposed National Energy Codes?

A:

Q8: Should Manitoba implement minimum energy-use standards for equipment in commercial buildings and household appliances?

A:

Transportation

Transportation is an integral part of Manitoba's economy. The province's large area and sparsely distributed population call for a very extensive transportation system. The vast majority of passenger transportation in Manitoba is based on automobiles. Long distance passenger travel also includes inter-city buses, trains and air, with some minor use of marine. Trucks, railways, air and marine support freight transportation. Trucking is the most significant form of moving freight within the province and between the province and other locations. Manitoba's trucking industry consists of 33 major carriers, one-third of which are based in Winnipeg.

Transportation contributes 32 per cent of Manitoba's greenhouse gas emissions.[1] With the baseline greenhouse gas emissions from transportation in Manitoba increasing from 7290 kt CO_2 eq (kilotonnes per CO_2 equivalent) in 1990 to 8120 kt CO_2 eq in 1997, the trend is escalating.

A number of key challenges face the transportation system in Manitoba as it develops a strategy to address climate change. On the passenger side, nearly 80 per cent of Manitobans rely on automobiles to get to work. Urban bus transport has been decreasing, even though the numbers of buses and routes are increasing. Most urban commuters tend to consider only personal convenience when deciding how to travel from the suburbs to offices downtown. This results in the use of their own vehicles instead of public transit.

On the freight side, demand for transportation is based on the products moving either in or out of the province, including movements within the province. This derived demand is not something the transport system can control, which limits some of its options to reduce trips. Also, many industries operate on a just-in-time basis that puts more emphasis on rapid delivery of products, again limiting some options for reducing greenhouse gas emissions.

In northern Manitoba, rising temperatures are expected to lead to extensive permafrost melting. As many roads and airstrips, as well as the railway to Churchill, are built upon permafrost, disruption of northern Manitoba's infrastructure is expected. Warmer winters will also reduce the length of time ice roads can be used, reducing the access of remote communities to needed services and increasing the need to fly in supplies.

In the past, such as in response to the 1970s energy crisis, government and industry worked to increase the energy efficiency of automobiles. Programs in this area have decreased in recent years, and might need to revive in order to mitigate the rate and impacts of climate change.

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[1] Environment Canada. 1997 Greenhouse Gas Emission Summary. www.ec.gc.ca/pdb/ghg/Provem_e.cfm.

Questions:

Q1: What do you think are practical ways for reducing greenhouse gas emissions from all or each of the various transportation sector modes in Manitoba? (e.g., urban, freight, off-road, air, rail and marine.)

A:

Q2: What policies would lead to a reduction of the number of single-occupant vehicles in urban and/or rural traffic?

A:

Q3: Are the full costs of using Manitoba's transportation infrastructure being applied to the appropriate users? Could this cost be imposed within Manitoba alone, or would it need to be integrated with a Canadian/North American transportation policy?

A:

Q4: How can current policies that foster the use of renewable energy in the transportation sector be improved?

A:

Q5: How can the current policies of the Manitoba government be used to foster further technological innovations in the transportation sector? How can these policies be improved?

A:

Q6: Would the reduction of urban sprawl lower greenhouse gas emissions from transportation? How can appropriate policy best be implemented to achieve this result?

A:

Q7: What are the opportunities for inter-modal shifts in freight transportation? What would be the consequences of this shift for the Manitoba economy?

A:

Q8: How can the Province of Manitoba encourage the use of inter-modal transportation?

A:

Q9: In your community, how viable is public transit as an alternative to personal automobile use?

A:

Q10: What should be the components of a sustainable transportation system for large cities in Manitoba?

A:

Q11: Other than greenhouse gas emissions, what are the other social costs or externalities of transportation that must be considered?

A:

Q12: What alternative energy options are practical to implement in the transportation sector?

A: